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Technical Information
Conducal CLY421

Conductivity calibration kit for ultrapure water applications

Application

Ultrapure water is used in sensitive areas of the pharmaceutical and food industries and in process engineering. Calibration of process conductivity measurement is absolutely necessary for these applications.

Conducal is a reference unit that permits the calibration of process measuring devices by means of a certified comparison measurement. It can be used as follows:

- Calibration of quality-relevant process measurements in the ultrapure and pure water range up to 20 µS/cm
- Calibration of in-line measurements after inspections or interruptions in operation
- Calibration of measuring systems in the pharmaceutical and food industry
- Calibration to ensure product quality, such as in the semi-conductor industry, for example

Your benefits

- Factory calibration traceable to NIST and PTB
- Factory calibration of the Conducal system according to ASTM D-5399–93
- Flow assembly with adjustment and monitoring functions according to ASTM D-5391
- Flexible use in the field
- Easy to clean thanks to polished surfaces
  - Battery-operated system (independent of power network)
  - Robust IP67 case with external sensor connection

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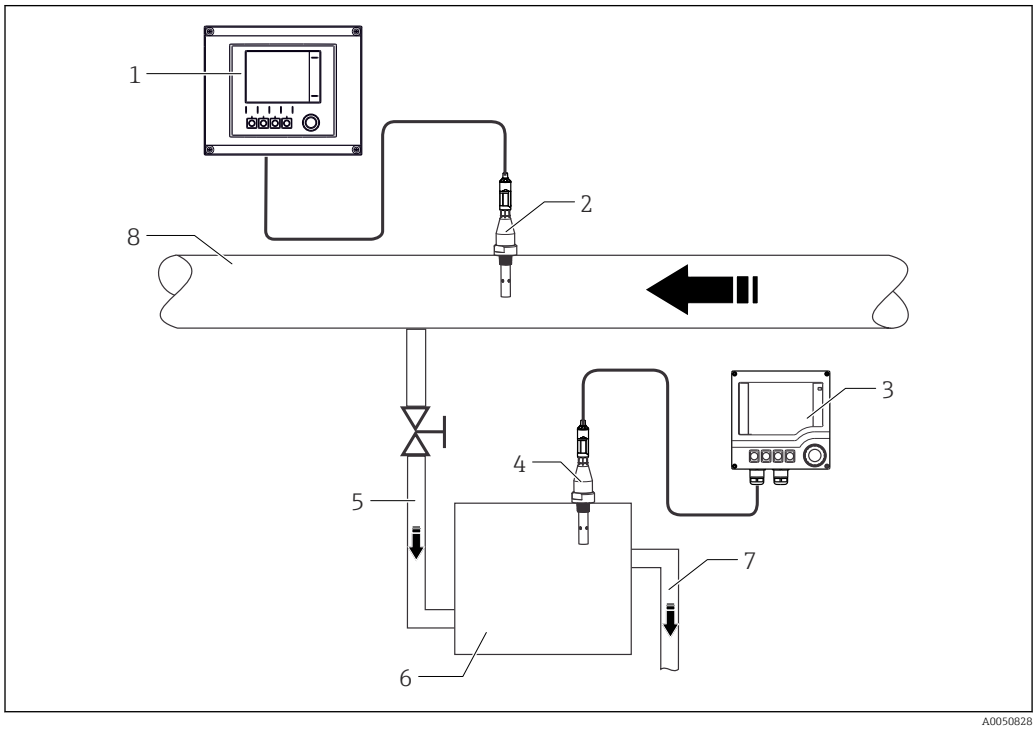
Function and system design

Measuring system

Comparison measurement with bypass (preferred)



1 Measuring arrangement for comparison measurement in the bypass

1 Process transmitter
2 Process conductivity sensor
3 Calibration kit transmitter
4 Calibration kit conductivity sensor
5 Bypass outlet
6 Calibration kit flow assembly
7 Bypass inlet
8 Sterile main pipe

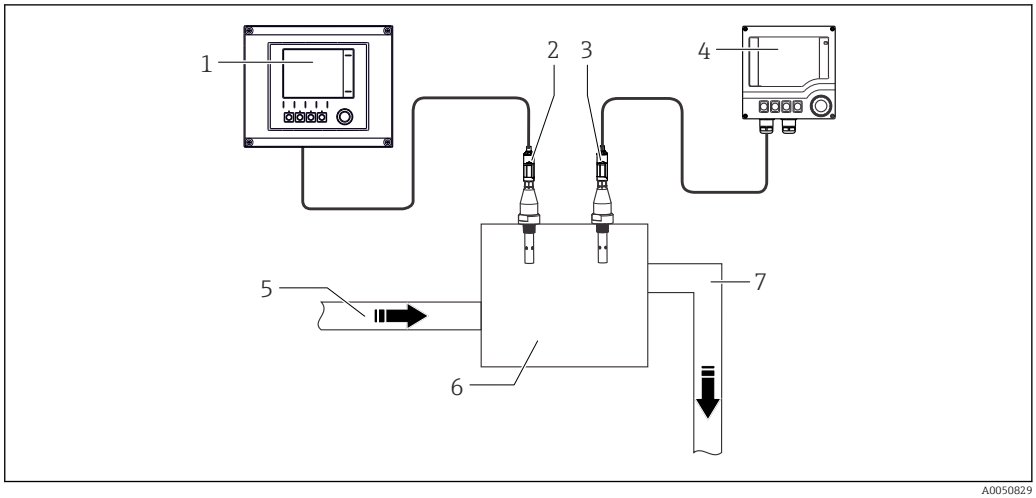
With this measuring arrangement, the sensor is not removed from the process. Please ensure that the composition of the medium and the temperature at the process measurement point and comparison measurement point are the same.

This is ensured by:
- Using short hose connections
- Waiting until the temperature in the flow assembly adjusts to match the process temperature.

Advantage:
Process remains hygienic

Disadvantage:
Waiting time for temperature harmonization

Direct comparison measurement



2 Measuring arrangement for direct comparison measurement

1 Process transmitter
2 Process conductivity sensor
3 Calibration kit conductivity sensor
4 Calibration kit transmitter
5 Outlet
6 Calibration kit flow assembly
7 Inlet

The flow assembly included with the calibration kit has two installation slots for conductivity sensors and therefore enables a direct comparison measurement.

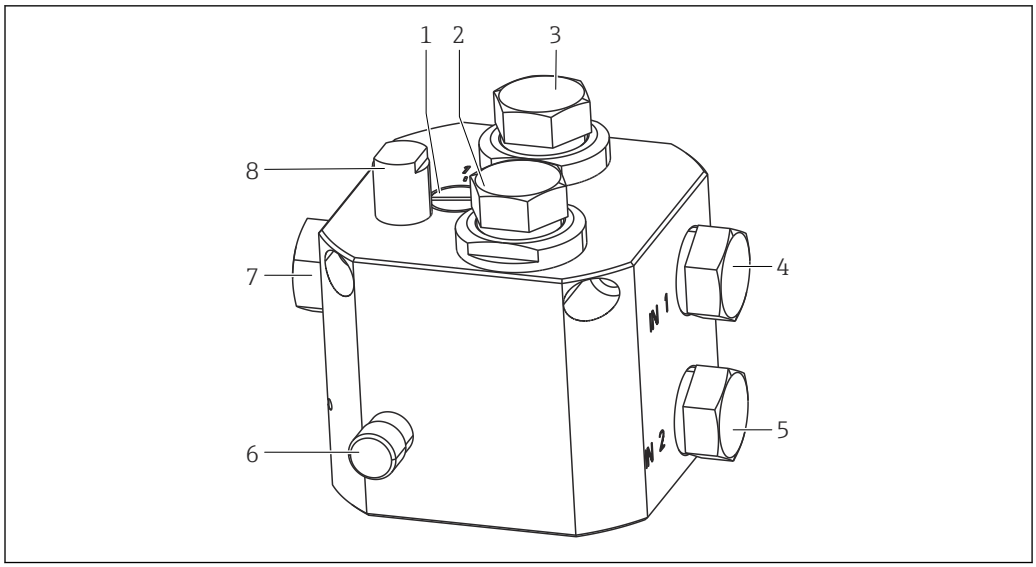
Advantages:
- No temperature difference, therefore no waiting time
- Absolutely identical medium

Disadvantage:
As the process must be opened, the medium can become contaminated

Dependability

Flow assembly

The Conducal calibration kit is fitted with a special flow assembly for the Memosens CLS15E conductivity sensor.

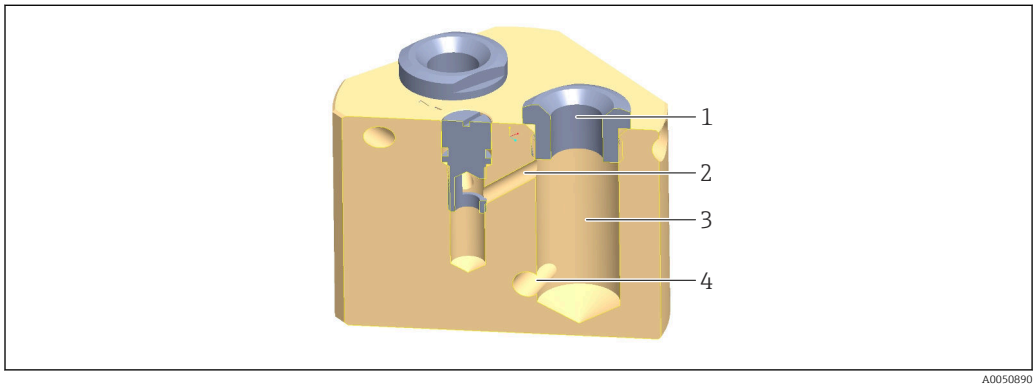


3 *Flow assembly*

1 *Switch from bypass (1) to direct (2)*
2 *Installation slot for calibration kit conductivity sensor*
3 *Installation slot for process conductivity sensor*
4 *Inlet for bypass measurement*
5 *Inlet for direct comparison measurement*
6 *Flow control valve*
7 *Outlet*
8 *Flow monitoring*

Bubble trap

The medium must be bubble-free to prevent false conductivity measurements. Outgassing can occur when the medium releases tension, i.e. also in the bypass arrangement described. Thanks to the bubble trap integrated in the flow assembly, the medium around the conductivity sensor stays bubble-free.



4 *Medium supply in case of comparison measurement with bypass*

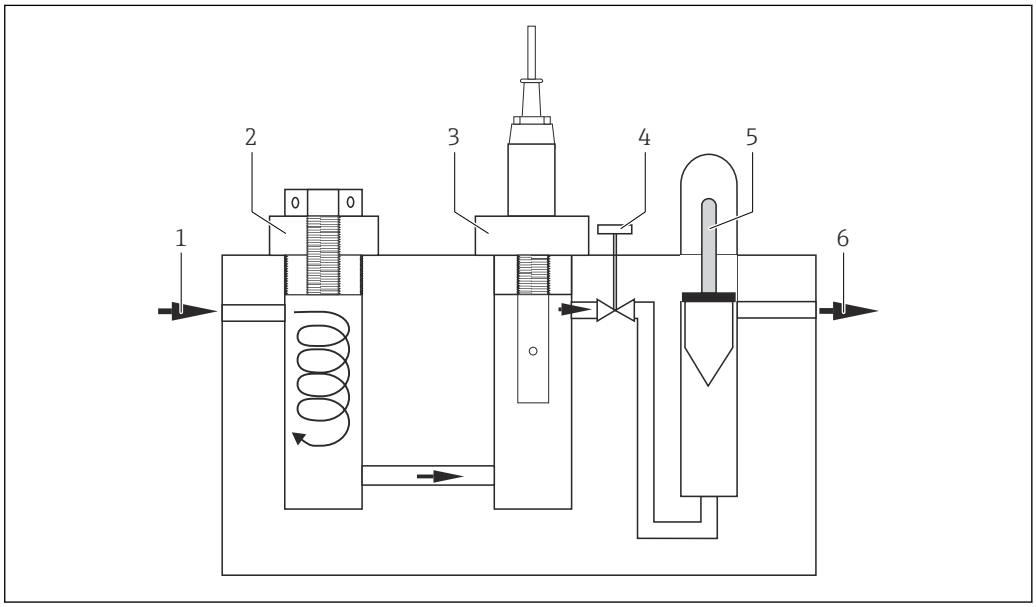
1 *Vent hole*
2 *Inlet*
3 *Second installation slot*
4 *Lateral bore hole*

When the flow assembly is used with the bypass setting, the second installation slot is used as a hydrocyclone. Inflow is tangential, producing a turbulent flow, so any bubbles can escape through a vent opening at the top. The medium is conveyed to the actual measurement chamber via a lateral bore hole.

Controlled conditions with flow monitoring

When calibrating with Conducal according to ASTM D-5391, a minimum flow specified by the sensor manufacturer must be observed.

The flow assembly in the Conducal calibration kit is designed for conductivity calibration according to the standards:
- Bubble trap (for bypass measurement)
- Float-type flow measurement
- Flow adjustment with control valve
- Temperature stability up to 100 °C (210 °F)

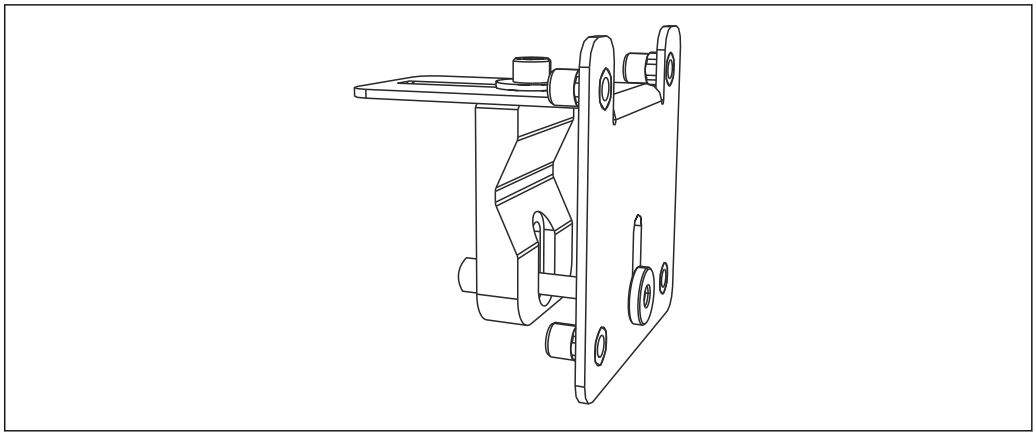


5 Schematic of bypass arrangement

1 G½ inlet
2 Vent
3 Calibration kit conductivity sensor
4 Flow control valve
5 Flow monitoring
6 G½ outlet

Holder for pipe mounting

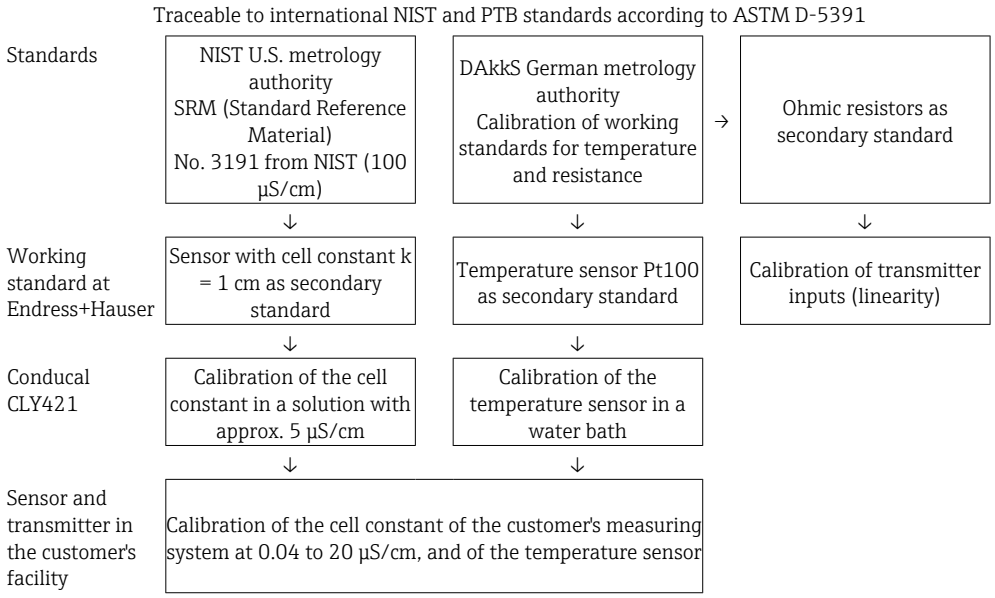
The flow assembly is equipped with a flexible holder for mounting on round and square pipes. This makes comparison measurements in the field safe and easy.



6 Holder

Calibration

Calibration of Conducal CLY421 (flowchart)



Input

Measured variable

Conductivity [µS/cm] or [MΩcm]; configurable

Power supply

Supply voltage

Wide range power supply 100 to 240 VAC, 47 to 63 Hz, Class II equipment with functional grounding

Battery

Integrated lithium-ion battery 14.4 V; 2.4 Ah

The fully charged battery enables a calibration kit operating time of over 80 hours.

External sensor cable connection

Buccaneer plug, 6-pin, IP 68

Performance characteristics

Error calculation

Reference system adjustment with standard NIST reference material

Uncertainty of reference solution	0.2 %
Uncertainty of temperature measurement	<< 0.1 %
Uncertainty of reference system display	0.2 %
Total uncertainty of reference system adjustment	0.3 %

Conducal adjustment with 5 µS/cm (or 200 kΩcm)

Uncertainty of reference system adjustment	0.3 %
Uncertainty of reference system measurement at 5 µS/cm	0.6 %
Uncertainty of Conducal display at 5 µS/cm	0.6 %

	Total uncertainty of Conducal adjustment at 5 µS/cm	0.9 %
	(Only corresponds to the uncertainty of Conducal. The adjustment of measuring points with Conducal requires an additional uncertainty analysis.)	
	The change of the Memosens CLS15E cell constant in the conductivity range between the standard reference material and 5 µS/cm is not considered.	
Reference devices	Reference measuring device used	Liquiline CM42
	Reference measuring cell used	Condumax CLS15E

Environment

Ambient temperature	+5 to +40 °C (41 to 104 °F)
Relative humidity	Max. 80 %
Operating altitude	Up to 2000 m
Degree of protection	IP 30 with case open IP 67 with case closed without power cable Indoor use (Pollution degree II)

Process

Process temperature	0 to 100 °C (32 to 210 °F)
Process pressure	Max. 6 bar (87 psi)
Minimum flow	30 l/h (8 gal/h)

Mechanical construction

Dimensions	L x W x H (case)	530 x 442 x 215 mm (20.9" x 17.4" x 8.5")
Weight	Approx. 12.7 kg (28 lb)	
Materials	Flow assembly:	PVDF
	Clamp seal:	EPDM
	Adapter	PVDF
Process connection	Inlet:	G½ or Clamp ½" outlet
	Outlet	G½ or Clamp ½"
	Vent	G½

Certificates and approvals

Current certificates and approvals that are available for the product can be selected via the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Configuration**.

Ordering information

Scope of delivery

The scope of delivery includes:
- Calibration kit in the version ordered
- Operating Instructions Conducal CLY421
- Calibration certificate

If you have any questions, please contact your supplier or your local sales center.

Product page

www.endress.com/CLY421

Product Configurator

1. **Configure**: Click this button on the product page.
2. Select **Extended selection**.
   ↳ The Configurator opens in a separate window.
3. Configure the device according to your requirements by selecting the desired option for each feature.
   ↳ In this way, you receive a valid and complete order code for the device.
4. **Apply**: Add the configured product to the shopping cart.

For many products, you also have the option of downloading CAD or 2D drawings of the selected product version.

5. **Show details**: Open this tab for the product in the shopping cart.
   ↳ The link to the CAD drawing is displayed. If selected, the 3D display format is displayed along with the option to download various formats.

Accessories

The following are the most important accessories available at the time this documentation was issued.

Listed accessories are technically compatible with the product in the instructions.

1. Application-specific restrictions of the product combination are possible.
   Ensure conformity of the measuring point to the application. This is the responsibility of the operator of the measuring point.
2. Pay attention to the information in the instructions for all products, particularly the technical data.
3. For accessories not listed here, please contact your Service or Sales Center.

Device-specific accessories

Memosens CLS15E
- Digital conductivity sensor for measurements in pure and ultrapure water
- Conductive measurement
- With Memosens 2.0
- Product Configurator on the product page: www.endress.com/cls15e

Technical Information TI01526C

Flowfit CYA21
- Universal assembly for analysis systems in industrial utilities
- Product Configurator on the product page: www.endress.com/CYA21

Technical Information TI01441C

Service-specific accessories

Calibration service
Recalibration
- The conductivity calibration kit must be calibrated regularly onsite at the manufacturer's depending on the frequency of use and operating conditions.
- Recommended period: 1 year

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